

The Research of The 360-degree Evaluation System in Performance Management of High-tech Enterprise

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Abstract— With the development of society and the establishment of modern enterprise, high-tech companies increasingly tend to adopt a human resources development strategy which based on performance. So, performance management will become a hot topic in human resources management. And it is possible that performance management become more refined. This article focused on the discussion of the evaluation methods in 360-degree evaluation system. Combining the theory of performance management and quantitative evaluation, Introducing quantified thoughts, establishing the model quantitative evaluation and quantifying evaluation results, it may promote high-tech enterprises form a scientific, standardized and effective evaluation system.

Keywords—high-tech enterprises; 360-degree evaluation system; performance management; evaluation system

I. INTRODUCTION

High-tech enterprises are companies which use the advanced technology to produce wealth. Compared with the traditional enterprise, high-tech enterprises have the characteristic of high input, high-risk, high yield and high rates of growth. And the staffs in the high-tech mostly are knowledge-type employees. They pay more attention to the performance evaluation of fairness and justice, but the supervisory control for them is very difficult in their work time. In order to reduce the valuation of the subjectivity of their managers, the majority of high-tech enterprises' managers will use the 360-degree performance evaluation techniques which can comprehensive evaluation an employee performance.

According to this performance evaluation, the staff not only can obtain feedback from a variety of Angle by themselves, leaders, subordinates, colleagues and even their customers, but can be clearly aware of their deficiencies, strengths and development needs to make future career development more successful.

Compared to the traditional information feedback system which has a single source of information, 360° evaluation system has a high credibility and effectiveness. In addition, it can provide feedback from various aspects that have a comprehensive, anonymity and objectivity. So, it can reflect staffs' job performance more accurately, and staffs are willing to accept the results of evaluation.

II. BRIEFLY INTRODUCTION OF PERFORMANCE MANAGEMENT

A. The definition of Performance Management

The definition of performance management has three perspectives:

1. Performance Management is the management system of organization performance. Rogers and Bredrup consider that performance management is the system of management organization performance. And Bredrup (1995) view that performance management should include planning, improvement and examine the three processes.

2. Performance Management is the management system of staff performance. Ainsworth and Smith (1993) proposed a performance management process should include: planning, estimation and correction.

3. Performance Management is the system of combining with organization performance and staff performance. Costello (1994) proposed that Performance Management is combining the work of employees or managers and the purpose of the company to support the company's overall business. Walters (1995) proposed Performance Management is that guidance and support the employees' work by need of organizations to get the greatest achievement.

B. Methods of Performance Management

There are many methods of performance management. According to the process of the performance management we can put them into index method, behavioral method, sorting method and comments method. Index method refers to the index design and index produced to manage the performance of works. They include that Management by Objective (MBO), Key Performance Index (KPI), and Balanced Scorecard Card (BSC). This also is the three ways which is systematic and most widely used. Behavioral method is a way to observe and assess the performance in the process of implementing and improving. It's including critical incident method, behavior anchor method, behavior observation scale method, hybrid standard scale method and so on. Sorting method can also be called comparison method, an evaluation of the performance behaviors and results after treatment, including direct sequencing method, alternating sort method, match sort method, benchmark comparison method and compulsory distribution method, etc.; Comments

method is the method by comprehensive evaluating for performance behavior and performance results.

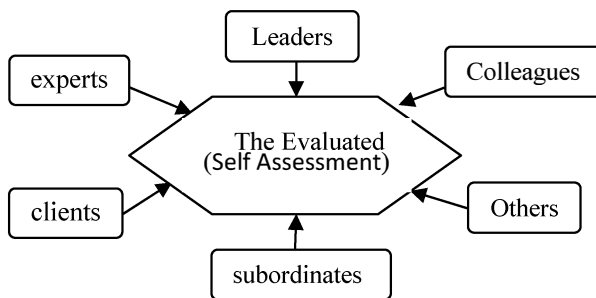
The above performance management, which are all proposed and developed with business management needs. In practice, each performance management methods are not obvious advantages and disadvantages. Most enterprises are all comprehensive using performance management tool, such as the 360-degree Evaluation System which combine the theory of performance management and quantitative evaluation. In fact, no matter which kinds of performance evaluation methods is used, suitable for team is the most important.

III. THE 360-DEGREE EVALUATION SYSTEM

A. The 360-degree feedback evaluation system

The 360-degree feedback evaluation is also named comprehensive evaluation or multiple source feedback evaluation. The main concept is many people including valuers and the one-sided assess for specific individual. In other word, according to the individual leadership behavior or management ability, the valuers, including themselves, leaders, subordinates, colleagues and experts or consultant, will take a full range of assessment and then give a feedback after the evaluation. (Figure 1)

Figure 1 Schematic diagram of 360-degree feedback evaluation



B. 360-degree examination evaluation system

360-degree feedback evaluation model is mainly reflected the examination evaluation and evaluation of individual development. This paper focuses on the part of its examination and evaluation. 360-degree examination evaluation has the following main steps:

Firstly, choose the evaluation staff. The assessors who we are chosen are directly related to the evaluation of the success or failure, so the evaluation must be represented by the area. Only in this way, this evaluation which is all-round and three-dimensional can be objectively for Employee performance. Evaluation staff settings can be specific for the immediate supervisor of employees, colleagues, themselves, the lower level employees, the customers, and the outside experts or consultants.

Secondly, design performance appraisal form base on the work content. The performance appraisal form settings can access the job description can also be allowed to fill out questionnaires or take job interview. Through that, we can

understand the job need, such as the kind of knowledge, skills, working intensity and attitude and so on.

Thirdly, formulate assessment standards. No matter how to divide the performance evaluation index, the inspection work should be done: the standards of assessment should be quantifiable and visible as far as possible, should be more for behavioral description, rather than evaluative description. Assessment standards should as far as possible concise, otherwise it is difficult to decide the size of assessment indexes weights. In formulating assessment standards, we need to consider enterprise actual characteristic and development strategy, and then establish the index system which is pertinence, suiting for enterprise strategic and supporting enterprise strategic target.

While formulate assessment standards and design evaluation form, we need to divide the post into different types objectively, not only use a company-wide examination tables. Because post different, assessment elements are different. We can divide the company employees into four categories by their work, namely managers, technicians, production crew and salesmen. We need formulate assessment standards according to the different working property characteristics. So, this resulting examination scores can an absolute value, and can be embodied the relative position in this class post.

Then, determine evaluation indexes weights, namely determine the assessment standards in a proportion of total target weights. The standards are not the same for different employees, and the weights are not the same too. So, we should be treated separately for different job categories.

At last, determine the examiner weight. In the process of working, we can form various working relationship, such as leadership and subordinate relationship, the colleague relationship and so on. Because of the different relationship and the different background, we have different impression on staff who is accepted this evaluation, we need to notice the difference between the useful information and extraneous information. Moreover, for each type of employees working characteristics, the weights of assessment should be different. For example, sales personnel's work is mainly communication with the customers, so customers' evaluation weight should be larger; Technicians, especially the employees in high technical content, their work have strong professional, and relatively independent. So, its achievement is not easy assessed, and experts and colleagues evaluation weight should be larger. The examiner weight need determine by actual situation.

C. 360-degrees quantitative evaluation system

Many descriptive assessment results of employee is auxiliary, and don't really involved in the employee's performance appraisal. It is the drawbacks of evaluation in previous assessment, so we need to quantize the evaluation standards and the assessment results. The purpose of establish quantitative evaluation model is quantize the assessment results and promote the enterprise form scientific, standardized and effective assessment system. This "quantification" is not only means that use numerals test the project (such as the quantity of the finish work), but also

quantize some abstract standards (such as the quality of the finished work).

The quantification of performance evaluation is helpful to improve the working efficiency of the enterprises. And it can provide timely and objective information; can provide support for establishing incentive system; can render a service to establish the reasonable salary distribution system and personnel selection system. The development of the enterprise production efficiency is a continuous accumulation process. And in this process, quantitative evaluation system can promote the factors which decide the increased efficiency to accumulate. Meanwhile, because of the rapid development of information technology, the quantitative evaluation system can processing assessment results efficiently, objectively and accurately by computers, thus greatly reduced the cost.

IV. THE PERFORMANCE MANAGEMENT EVALUATION MODEL BASED ON 360 DEGREE EVALUATION METHOD

We need to combine multiple factors and use comprehensive evaluation method to construct 360-degree quantitative evaluation model.

A. Model

1. To determine the performance goals set. Be the Performance Goals Set were $X = \{x_1, x_2, x_3 \dots\}$

2. Determine the Assessment Index Set, $Y = \{y_1, y_2, y_3 \dots\}$ In the complete, scientific, and systematic assessment system, to establish the reasonable set is very important. The evaluation index is theoretical basis of performance evaluation. Setting up reasonable set concern to correctly evaluate employees, and make the quantization of work-related behavior. In practice, this work can continue to improve and enrich.

3. Identified the Evaluation Index Weights. $Z = \{z_1, z_2, z_3 \dots\}$, $\sum Z_i = 1$. $z_1, z_2, z_3 \dots$ represent the elements in the weight of the assessment of the system. Because of different types of work and different evaluation purposes, the amount of each element can happen in the corresponding changes. For instance, for general staff, the quantity and quality of work is more important. To research personnel's inspection, the creative is more important. To management, the overall performance and team spirit are more important.

4. Evaluation Set and Quantitative Set.

Evaluation Set: $P = \{p_1, p_2, p_3 \dots\}$; Quantitative Set: $Q = \{q_1, q_2, q_3 \dots\}$ P and Q are the corresponding function sets. We make the qualitative (not pure quantitative) into quantitative firstly. For example, $Q: (100, 80, 70, 60)$, corresponding to $P = \{\text{excellent, good, middling, poor}\}$. And each element of Q can be adjusted depending on the circumstances. We should ensure that the q to p correspondence. Namely, excellent (100) > good (80) > middling (70) > difference (60).

5. 360 degree evaluation

Assessment Set: $A = \{a_1, a_2, a_3 \dots\}$, Weights Set: $W = \{w_1, w_2, w_3 \dots\}$. $\sum W_i = 1$.

6. Design assessment questionnaire

Assessment questionnaire is appeared in front of the assessor only written materials, and will serve as the only basis of performance evaluation. Its design is usually available in Table 1 of the style, but also depends on the integrity of the entire table target set X , Y and evaluation factor set P . r_{nm} is the percentage which the number of people who make the P_m evaluation/ overall number of people. And $\sum_m r_{nm} = 1$.

TABLE I. ASSESSMENT QUESTIONNAIRE

Assessors	Evaluation			
	P_1	P_2	P_3	P_4
a_1	r_{11}	r_{12}	r_{13}	r_{14}
a_2	r_{21}	r_{22}	r_{23}	r_{24}
a_3	r_{31}	r_{32}	r_{33}	r_{34}

7. Model

Through summarizing assessment questionnaire, we need calculate its comprehensive evaluation score for one assessment target x_i . The evaluation index is y_j , the assessed for evaluation set is a_n , the evaluation matrix for evaluation set is R_j .

$$R_j = \begin{bmatrix} r_{11} & K & r_{1m} \\ M & O & M \\ r_{n1} & L & r_{nm} \end{bmatrix}$$

In the assessment of each evaluation index set on the results, y_j weighted by the evaluators as $B_j = W \times R_j \times x_j$. Comprehensive evaluation matrix

$C = Z \times \begin{pmatrix} B_1 \\ M \\ B_j \end{pmatrix}$, the points of comprehensive evaluation $D = C \times QT$. Comprehensive above is

$$D = Z \times W \times \begin{pmatrix} R_1 \\ M \\ R_j \end{pmatrix} \times QT$$

B. Fixed the parameters in the model

1. Calibrated the element y_j in the Assessment Index Set Y .

In the practical work, because of the different purposes, we should be taken to a different evaluation index system, and should be carried out with the assessment, which is

based on the feedback assessment. Then we need revise assessment index set elements.

2. Calibrated the element z_i in the Evaluation Index Weights Set Z.

Fixed z_i depends on evaluation system of Z determination. No matter what method is utilized, we need to be noted that different evaluation purposes, positions and types lead to the z_i different. But we should definitely one thing is $\sum z_i = 1$

3. Calibrated the Evaluation Set and the Quantitative Set

Evaluation Set and Quantitative Set is one to one, so the elements of the Quantitative Set need to be calibrated while we calibrate the elements of the Evaluation Set. Without breaking the one-to-one relationship, we can only calibrate quantification centralized element value in order to achieve the quantification is more reasonable and better effect of distinction.

4. Calibrate w_i of the Weights Set W

The w_i correction depends on the way to determine the w_i in evaluation system. But $\sum w_i = 1$

C. Case analysis

If a department of a high-tech enterprises of the department heads A, B and C for evaluation and assessment of its operation as follows.

1. The performance goals set $X = \{A, B, C\}$

2. The Assessment Index Set $Y = \{\text{performance, attitude, ability}\}$

3. The Evaluation Index Weights $Z = \{0.7, 0.2, 0.1\}$

4. The Evaluation Set $P = \{\text{excellent, good, bad}\}$ and the Quantitative Set $Q = \{100, 80, 60\}$.

5. The Assessment Set $A = \{\text{superiors, colleagues, subordinates, customers, own}\}$ and the Weights Set $W = \{0.4, 0.2, 0.2, 0.1, 0.1\}$

6. Collect questionnaire (for example A). We can see the result such as follows:

$$R1 = \begin{bmatrix} 0.5 & 0.5 & 0 \\ 0.4 & 0.4 & 0.2 \\ 0.5 & 0.5 & 0 \\ 0 & 0.7 & 0.3 \\ 1 & 0 & 0 \end{bmatrix} \quad R2 = \begin{bmatrix} 0 & 1 & 0 \\ 0.2 & 0.4 & 0.4 \\ 0 & 0.5 & 0.5 \\ 0.3 & 0.7 & 0 \\ 0 & 1 & 0 \end{bmatrix}$$

$$R3 = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0.5 & 0.5 \\ 0.3 & 0.3 & 0.4 \\ 0.1 & 0.2 & 0.7 \\ 0 & 1 & 0 \end{bmatrix}$$

$$7. D = Z \times W \times \begin{pmatrix} R_1 \\ M \\ R_j \end{pmatrix} \times QT$$

The examination score of A is 83.76

V. CONCLUSION

All in all, a good performance evaluation is not only reflecting the evaluation of job performance, but also can be the basis of a staff promotion, salary adjustment and bonus. And quantitative discussion of the 360-degree evaluation model is conducive to the work of improvement, interpersonal harmony, streamlined and efficient personnel, employee career planning and development and utilization of corporate human resources. In this paper, the 360 degrees quantitative evaluation model is need to calibrate the specific assessment system according to the hi-tech enterprise characteristic of oneself, and achieve better management results.

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